Device/User Interface Software Requirements For Decom 7715 Bit Sync

Version 1.0

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Submitted by: _____
Software Engineer Date

Approvals: _____
Hardware Engineer Date

_____
Operations Date

_____
Project Lead Date

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1.0 Introduction

This document provides device and user interface requirements for the Decom 7715 Bit Sync.

2.0 Required Functionality

The bit synchronizer is a device within the Data Handling Node. This device is designed to synchronize to and reconstruct a serial PCM bit stream which may be contaminated by noise, phase jitter, amplitude and baseline variations. The device provides as outputs reconstructed NRZ-L data, coherent clocks and various status signals.

3.0 Parameter Ranges

The AGS/SGS requirements do not differ from the device capabilities for the PCM Bit Synchronizer.

4.0 Communications Protocol

RS-232 protocol will be used to communicate with this device from the node computer.

5.0 GUI Functionality

See Appendix A: Graphical User Interface Requirements

6.0 Command Scripting

See Appendix B: Scripting Requirements

7.0 High-level Status

The minimum set of parameters necessary to determine the 7715 bit sync's high-level status are:

- PLL Sync, 0 = in sync (IN or OUT for not in sync)
- FEC Sync, 0 = in sync (IN or OUT for not in sync)
- Signal Level, 00 = in range (IN)
  01 = low level (LO)
  10 = hi level (HI)
- Mode, remote control (REM or LOC for local control)

Status checks should begin when a signal is detected. Status bits should be polled and reported every second until LOS or until operation is ended.

On setup, change in device and/or status change, an REQ1 setup readback should be sent to the device in order to ensure the devices setup has not been inadvertantly modified.

8.0 Replacement Algorithm

On any bad status, the Master will determine if the error occured in the bit synch and if so operations will be notified to investigate the reason for the bad status.

Appendix A: Graphical User Interface Requirements

The user will be able to access the following remote controllable features.

Bit Rate:

Minimum 10 bps (1.00 * 10E01) (default)
Maximum 15 Mbps (1.50 * 10E07)
with a minimum resolution of 0.1%

Loop Width:

The loop width allows the user to allow for bit rate drift of the input signal, as well as anticipated input SNR and jitter spectrum.

Loop Width	Op Code	
.1%	0	
.15%	1	
.2%	2	
.3%	3	(default)
.4%	4	
.6%	5	
.8%	6	
1.2%	7	
1.6%	8	

Input Code:

The 7715 will accept any of the following codes and decode them to NRZ-L. The input code must be set to agree with the code of the input signal. The 7715 will not process DM codes when programmed to M**2M codes.

Input Codes	Op Codes	
NRZ-L	0	(default)
NRZ-M	1	
NRZ-S	2	
BI0 -L	3	
BI0 -M	4	
BI0 -S	5	
DM-M	6	
DM-S	7	
Miller Squared Mark (M**2M)	8	
RZ	9	

Input Polarity:

Selection of input polarity is **required only when** using “Level” codes NRZ-L or BI0-L or RZ. For other codes this control has no effect.

Options	Op Codes	
inverted	0	
normal	1	(default)

Detector:

The 7715 has two selectable detectors which may be used when operating in NRZ.
It is not necessary to program the detector when operating in non-NRZ since the detector

type is fixed regardless of the program or front panel display.

Options	Op Codes	
integrate and Dump I/D	0	(default)
filter sample F/S	1	

Z in:

The 7715 provides a HI Z mode (12.5KOhms) and LO Z mode (75 Ohms or 50 Ohms) input impedance.

Options	Op Code	
HI (12.5 kOhms)	0	
LO (50 Ohms)	1	(default)

PN Mode:

The PN derandomizer in the 7715 is primarily intended for use with NRZ codes. However, this is not always the case. Regardless of the input code, **the PN mode must be programmed**, either OFF or to the appropriate sequence.

The derandomizer has the following options:

Options	Op Code	
Off	0	(default)
11 bit	1	
15 bit	2	
17 or 23 bits	3	
V.35 (INTELSAT)	4	
V.35 (CCITT)	5	

Input Source:

Up to four different signal sources may be connected to the 7715 rear panel with any one of the four programmed remotely. They are defined as S0 through S3.

Options	Op Code	
S0	0	(default)
S1	1	
S2	2	
S3	3	

Output Code:

Options	Op Code	
NRZ-L	0	(default)
NRZ-M	1	
NRZ-S	2	
BI0-L	3	
BI0-M	4	
BI0-S	5	
DM-M	6	
DM-S	7	
M**2M	8	

RZ	9

FEC (forward error correction):

Option	Op Code	
OFF	0	(default)
BPSK	1	
BPSK-D	2	
QPSK	3	
QPSK-D	4	
0QPSK	5	
0QPSK-D	6	

Rate:

The 7715 provides encoding and decoding at rate 1/2 or 1/3.

Option	Op Code	
Rate 1/3	0	
Rate 1/2	1	(default)

Self Test:

The 7715 allows for three self test options, long test will not be supported for this operation.

Option	Op Code	
Test Off	0	(default)
FEC Self Test (short loop)	1	

Loop Reset:

The 7715 allows for phase lock loop reset.

Option	Op Code	
On	1	
Off	0	(default)

Display:

The signal level should be displayed to the user. The display should indicate whether the signal is either Lo, In, or Hi.

The display should also indicate “in lock” or “ out of lock” for both the PLL and FEC.

Appendix B: Scripting Requirements

Master	Node	Comments/Error Handling

Resource Request Specific
Parameter: unit number
Parameter: configuration filename
	Start
	Check allocation table for unit number
	Check DIP switch settings
	Check for remote control
	Perform short test
	
	If available then
	Mark unit as assigned to this Master
	Reply " Unit # assigned"
	Open log file
	Retrieve configuration file from this Master
	Else
	Reply " Unit # not available"
	End
	Stop	

Resource Request General	Start
	Check allocation table for an available unit using the least recently used method
	Check DIP switch settings
	Check for remote control
	Perform short test
	
	If available then
	Mark unit as assigned to this Master
	Reply " Unit # assigned"
	Open log file
	Retrieve configuration file from this Master
	Else
	Reply " No units available"
	End
	Stop	

Setup Parameter: unit number	Start	

Master	Node	Comments/Error Handling

	Verify possession of unit by this Master
	
	If not assigned to this Master then
	Inform this Master
	Stop
	End
	
	Load and Verify configuration file
	
	If configuration file error then
	Inform this Master
	Stop
	End
	
	Stop
		>> Operator intervention required
		
		>> Operator intervention required

Start Support
Parameter: unit number
	Start
	
	Verify possession of unit by this Master
	
	If not assigned to this Master then
	Inform this Master
	Stop
	End
	
	Begin polling PLL status
	
	Poll PLL, FEC, and Signal Level Status at 1pps rate
	
	If status changes then
	Report status change
	End
	
	Stop
		>> Operator intervention required

Stop Support Parameter: unit number	Start Verify possession of unit by this Master	

Master	Node	Comments/Error Handling
	If not assigned to this Master then Inform this Master Stop End Stop	>> Operator intervention required
Takedown Parameter: unit number	Start Verify possession of unit by this Master If not assigned to this Master then Inform this Master Stop End Mark unit as not assigned Close log file Send log file to this Master Stop	>> Operator intervention required